Kathryn A. Peasha
11615 Kirkwood Street
Herald, California 95638

STATE OF CALIFORNA
ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

| | | |
|---|---|---|
| In the matter of<br>SMUD Consumes Power Plant<br>Application for Certification | )<br>)<br>) | Docket No. 01-AFC-19 |
| | )<br>)<br>)<br>)<br>)<br>) | Statement of Issues and Witness List and request for ~~Postponement~~ Additional of Evidentiary Hearings on Air Quality and Water Resources |

Intervenor in good faith submits this list of issues and witnesses. In addition I have attached a motion to ~~postpone~~ provide additional the evidentiary hearings on air quality and water resources. The request for ~~postponement~~ additional hearings of air quality is due to the lack of an FSA document, which contains staff's position on biology, and the absence of a Biological Opinion from the USFWS. Air Quality Impacts and Biological Resources are interrelated and without the biological opinion several key areas of air quality cannot be assessed. In fact the air district is required pursuant to Section 7 of the endangered species act (ESA) 16 U.S.C Section 1536 and its implementing regulations at 50 CFR Part 402 to have a final biological opinion with respect to the project from U.S. Fish and Wildlife to finalize the FDOC. It is also

2/24/03
3/11/03
OMK

inappropriate to analyze this porject in two phases, as the environmental impacts of the project will be understated. While the applicant may have financal reasons for not completing the project in one AFC the environmental review can and should include both phases of the project. By splitting the environmental review in two phases the applicant with the Commissions consent is undermining environmental regulations by understating the true magnitude and environmental consequences of this project. For statutory and analytical reasons I requests additional hearings postponement of the air quality section of the hearings. I also intend to dispute the Alternatives Analysis and Biological Resources Analysis in future hearings on these topic areas. I also petition to ~~postpone~~ provide additional testimony Water Resources issues till the second evidentiary hearing. After just receiving the FSA part 2 I have issues with staffs position but have not had adequate time to analyze the FSA and prepare for the Evidentiary Hearings. My witnesses who are being provided by CAlifornians for Renewable Energy (CARE) will need time to analyze staff's position and prepare testimony on the subject of Water Resources and associated collateral impacts on biological resources, visual resources, and air quality[1]. Additionally I restate my objection to the piecemeal issuance of documents and phasing of this project, which has lead to the bifurcation of these hearings and the certification process and has prevented any attempts at a comprehensive and meaningful analysis of this project.

[1] For example the projects approval should be conditioned upon the best public use of water resources including the requirement that reclaimed wastewater be used if available. The applicant has proposed to use reclaimed water in the second phase of the project to use reclaimed water. Intervenor objects to SMUD's tactic as illegally pre-committing to the projects approval by minimizing environmental impacts through a piecemealed project analysis. The Dry cooling technology alternative provides environmental benefits through reduction of the use of public water supplies and its associated biological impacts while eliminating the visual impacts associated with the steam plume that would result from proposed water-cooling technology.

TOPIC AREAS NOT READY TO PROOCED TO EVIDENTIARY HEARING

AIR QUALITY

Without the biological opinion the topic of Air Quality is not ready for Evidentiary Hearings. A complete discussion of air quality impacts is unrealistic without the Biological Opinion and the Final Staff Assessment Part 3 on Biological Resources. Additionally by allowing the environmental review of this project in two phases regulatory requirements have been subverted and a comprehensive analysis of the Air Quality Impacts from both phases of this project has been avoided. I have supplied a tentative witness below but believe this topic should be postponed.

WATER RESOURCES

The FSA Section on Water Resources was not issued till February 28. By requiring issues identification and prefiled testimony on Water Resources in only eight days is unreasonable. I intend to contest Water Resources and respectfully request to have it carried over till the 2nd Evidentiary Hearings are conducted.

# UNCONTESTED TOPICS

CULTURAL RESOURCES
EFFICIENCY
FACILITY DESIGN
GEOLOGY
RELIABILITY
TRANSMISSION LINE SAFETY
TRANSMISSION SYSTEM ENGINERING
WASTE MANAGEMENT

# CONTESTED TOPIC AREAS READY FOR ADJUDICATION

LAND USE
HAZARDOUS MATERIALS
WATER QUALITY ANDE SOILS
COMPLIANCE
VISUAL RESOURCE
TRAFFIC AND TRANSPORTATION
NOISE
LAND USE
FACLITY CLOSURE
PUBLIC HEALTH
~~SOCIOECONOMICS~~
~~WORKER SAFETY~~
WATER RESOURCES
BIOLOGICAL RESOURCES
ALTERNATIVES
AGENCY BIAS FOR PROJECT APPROVAL

# CROSS EXAMINATION SCHEDULE

Intervenor will utilize CARE's technical assistance to cross examine all staff and applicant witnesses in contested areas for at least 15 minutes for each witness. In the area of air quality I reserve the right to cross-examine applicant and staffs witness for approximately 1 hour. Intervenor also wishes to reserve time for rebuttal testimony.

Sincerely,
Kathryn A. Peasha
KATHRYN A. PEASHA

# WITNESS LIST

| TOPIC | WITNESS | TIME |
|---|---|---|
| AIR QAULITY | | |
| BACT | Mike Boyd | 30 minutes |
| CEC Staffs Current position On road paving credits EAEC And Tesla, GWF | Bob Sarvey | 15 minutes |
| New Standards for PM 2.5 | Mike Boyd | 15 minutes |

Tentative Exhibit list

CARB power Plant Guidance Manual pg. 12
ARB Memorandum June 16,2000 Position on Road Paving Credits
EPA comments on Pastoria Energy Facility
CEC Staff Status Report #5 Tesla Project
CEC Staff issues identification Report for the EAEC
EPA Comments on Three Mountain Power Project
Excerpt from CARB 2002 Almanac
Testimony of Mike Boyd
Testimony of Bob Sarvey

# Resume

Kathy A. Peasha
11615 Kirkwood Street
Herald, CA 95638

## Education

High School Graduate – Elk Grove, CA – 1975 General Education

Cosumnes River College – Sacramento, CA – 9/75-8/78 General Education

Otterbein College – Westerville, OH – 1/81-6/81 Radiologic Tech.

## Work Experience

Delta Radiology – Lodi, CA 8/91-Present
Radiologic Technologist – CRT and Mammography Certification.

Santa Cruz Medical Clinic – Santa Cruz, CA 2/87-9/87
Fluoroscopic and routine graphic diagnostic x-rays.
Reason for leaving, maternity leave.

John J. Wall, Inc. – San Jose, CA 6/86-2/87
Graphic diagnostic x-rays for orthopedic surgeon.
I was dismissed from my job because of my pregnancy.

Century 21 Award Real Estate – Scotts Valley, CA 3/86-9/87
Real Estate agent, residential. I also worked the above jobs while I worked selling real estate.

Columbus Radiology Inc. – Westerville, OH 6/82-1/83
Private radiology lab working with seven radiologists and one other technologist.
Fluoroscopy and routine graphic diagnostic x-rays. I also transcribed all daily dictated reports.
Reason for leaving, moved back to California.

Riverside Methodist Hospital – Columbus, OH 10/81-9/82
Worked on contingent basis while attending school. Mostly routine graphic and fluoroscopic x-ray, but some CT Scanner and emergency room work.

Warner Amex Cable Communications – Columbus, OH 4/81-10/81
Computer Data Entry – Part-time work while attending school.

Southside Radiology Incorporated – Sacramento, CA 11/78-11/79
Front desk, patient accounts, computer data input, transcribing, insurance billing, including Medi-Care and Medi-Cal. Also aided patients and dark-room procedures.

**Certifications**

State of California – C.R.T.

American Registry of Radiologic Technologists – A.R.R.T.

Personal References

John J. Wall, MD – 2120 Forest Avenue, San Jose
(408) 297-2012

Roberta Franz, Head Radiologic Tech. – Columbus Radiology Inc.
(614) 882-2143

Darlene Grosz, Business Manager – Southside Radiology Inc.
(916) 391-6171

To: Kathryn A. Peasha
11615 Kirkwood Street
Herald, CA 95638

From: Jacques A. Peasha

STATE OF CALIFORNIA
ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMISSION

| | | |
|---|---|---|
| In the matter of | ) | Docket No. 01-AFC-19 |
| SMUD Consumes Power Plant | ) | |
| Application for Certification | ) | Land Use |

Purpose

This testimony addresses the applicants use of SMUD's property. I have had experience on many construction projects and in my experience the use of site and lay down area is not being facilitated in the best and most cost effective way. SMUD testifies they require 20 acres for lay down area, basically for employee parking and fuel storage.

The area of each proposed 500 Mega Watt project is 15 acres. Colin Taylor has estimated in Data Response, Kathy Peasha set 2, that the aggregate area of RSP which is not used is estimated to close to 20 or more acres.

I believe that the applicants major concern is storage area to facilitate material which is going to be delivered prior to the readiness and need for it on the site.

Cost of time, research and mitigating the lay down area which in my experience for the 500 Mega Watt Power plant is not needed.

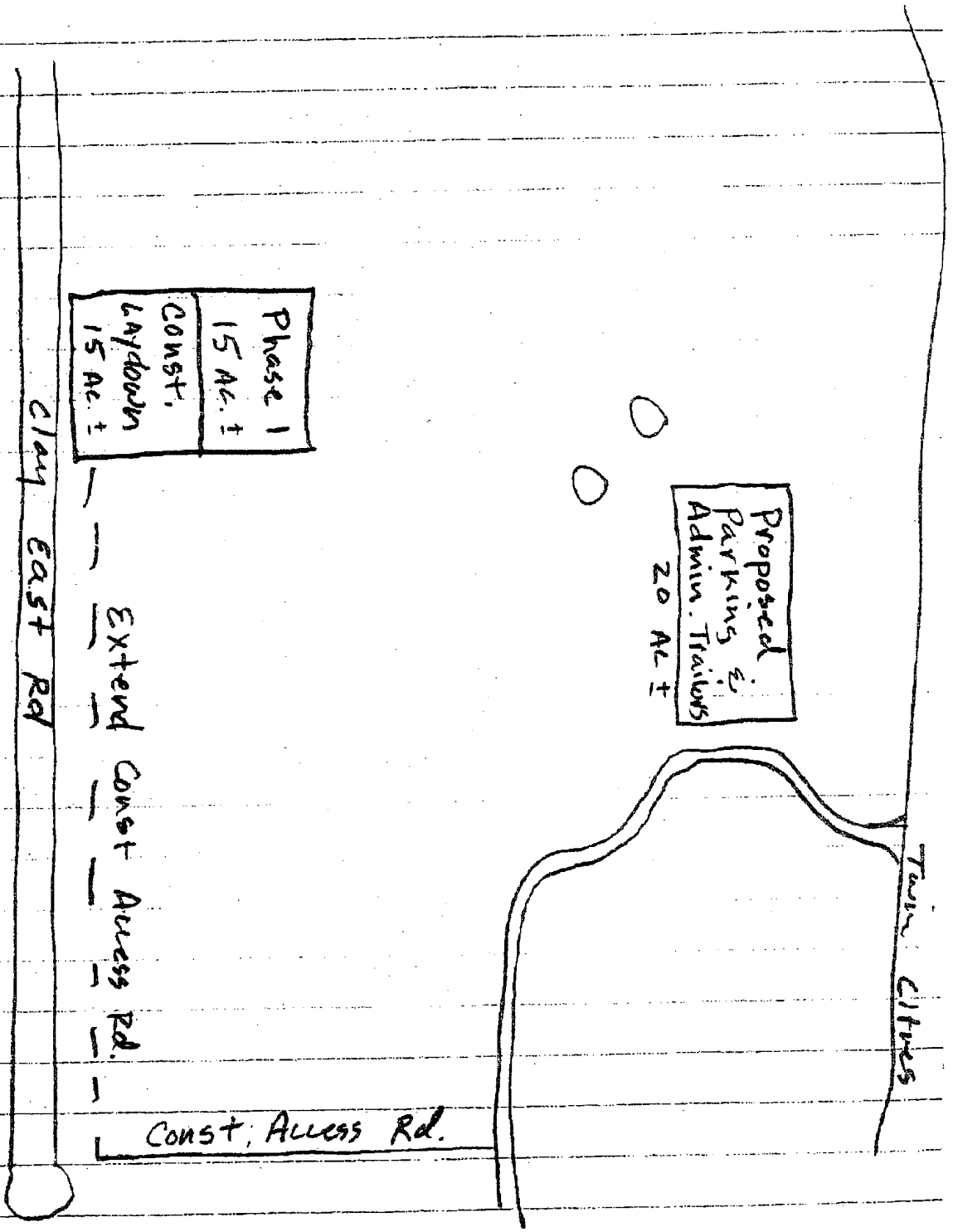
Attached is Map showing alternate land use for construction lay down, administrative trailers and parking.

It would be a minor cost to extend construction access road and transport workers to keep the project on the North side of Clay East Road than to mitigate all other impacts at this time. This would also make it a much more safe and secure construction project not having to cross Clay East Road continually as the applicant would like.

Sincerely,

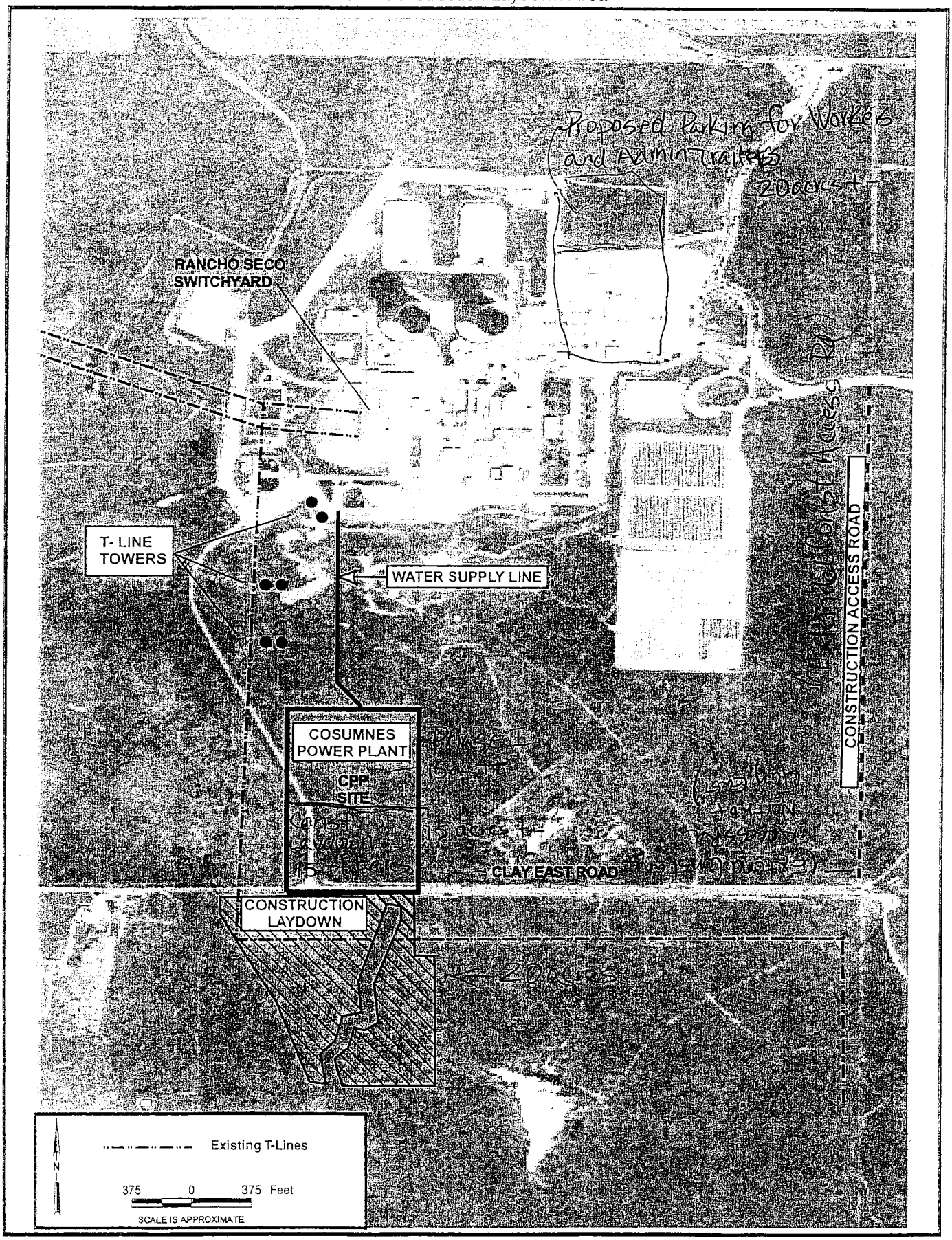
Jacques A. Peasha

Pg 2 of 2


Phase 1
15 Ac. ±
Const. Laydown
15 Ac. ±
Clay East Rd
Extend Const Access Rd.
Const. Access Rd.
Proposed Parking & Admin. Trailers
20 Ac. ±
Twin Cities

**PROJECT DESCRIPTION - Figure 8**

Cosumnes Power Plant - Location of Construction Access Road, Transmission Line Towers, Water Supply Line and Construction Laydown Area




CALIFORNIA ENERGY COMMISSION, SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION

SOURCE: SMUD 2001a,2002p,2002ae,2002ax,2003d

# JACQUES PEASHA

*11615 Kirkwood Street*
*Herald, California 95638*
*(209) 745-1290*

## EDUCATION

1973 - 1975 Westmont High School, Campbell, CA
1976 Elk Grove High School, Elk Grove, CA
1977 - 1978 Consumer River Junior College, Sacramento, CA
1979 - 1983 Construction Management at Columbus Technical Institute, Columbus, Ohio

## EMPLOYMENT

**1983 - Present**
**Superintendent at Pacific Mechanical Corporation, Concord, CA. Duties include: project scheduling, material purchasing, owner coordination, subcontractor scheduling, and job safety.**

2002 – Present Project Manager, Lincoln New Wastewater Treatment Plant Reclamation Facility, Del Webb Corp., Lincoln, CA - $14M

2000 – 2001 Project Superintendent, Penitencia WTP, Stage 1 Improvements, Santa Clara Valley Water District, San Jose, CA - $16.7M

1999 Project Manager, Santa Monica Urban Runoff Recycling Facility, City of Santa Monica, CA - $5.7M

1999 Project Manager, Moss Avenue Pump Station, Phase 2 Mechanical, City of Santa Monica, CA - $2.5M

1998 – 1999 Project Superintendent, Carson Hydrogen Plant, Underground Pipe Systems and Civil, Air Products and Chemicals, Carson, CA- $5.5M

1998 Project Manager, Moss Avenue Pump Station Phase I Civil, City of Santa Monica, CA - $2.5M

1997 – 1998 Project Superintendent, El Dorado Hills WWTP Ph II-B Upgrade & Expansion, El Dorado Irrigation District, El Dorado Hills, CA- $12.5M

1996 – 1997 Project Superintendent, Deer Creek WWTP Phase II, El Dorado Irrigation District, Cameron Park, CA - $12M

1995 – 1996 Project Superintendent, Odor Control Improvements, City of Bremerton, WA - $5.5M. Received $60K incentive bonus.

1995 Project Superintendent, Monterey Pump Station, Monterey Regional Water Pollution Control Agency, Monterey, CA - $1M

1994 – 1995 Project Superintendent, Peralta Well Ozone Treatment Project, Seaside, CA - $1.6M

1994 Project Superintendent, Travis AFB Sewer Pump Station Upgrades, Travis, CA - $1.3M

1993 – 1994 Project Superintendent, Flow Equalization Facilities, Delta Diablo Sanitation District, Antioch, CA - $3M

1991 – 1992 Project Superintendent, Wastewater Improvements, So. San Luis Obispo Sanitation District, Oceano, CA - $1.8M

1990 – 1991 Project Superintendent, Filter Plant Expansion, Stockton East Water District, Stockton, CA - $3.75M

# JACQUES PEASHA

1989 – 1990 Project Superintendent, North Stockton Pump Station Improvements, City of Stockton, CA - $2.5M

1988 – 1989 Project Superintendent, Flow Equalization Facilities, Laguna Wastewater Treatment Plant, City of Santa Rosa, CA - $6.1M

1986 – 1987 Project Superintendent, Wastewater Treatment Plant Expansion, San Luis Obispo Sanitation District, Oceano, CA - $4M

1984 – 1985 Carpenter Foreman, Ice Suppression System - Space Launch Complex 6, Vandenberg Air Force Base, CA - $2M

1983 – 1984 Carpenter, Watsonville Wastewater Treatment Plant Expansion, City of Watsonville, CA - $4.5M

1984 Carpenter, Watsonville Pump Station, City of Watsonville, CA - $3.7M

1979 – 1983 Attended night classes and received degree in Construction Management from Columbus Technical Institute while employed by Trio Construction, Columbus, OH.

Project Superintendent, commercial and light industrial. Projects included: Whaling Station, Westerville, OH; TGI Fridays, Columbus, OH; (3) fast-track projects for Jim Near of Sisters Chicken, Inc., Columbus, OH; Additions and remodels for Kroger Supermarkets and Bakery Facility, Columbus, OH

1979 – 1980
Carpenter Foreman, commercial and light industrial, for Trio Construction, Columbus, Ohio.

1976 – 1979
Union Carpenter, residential construction, for Ditz Crane Co., San Jose, CA.

1974
General Laborer for Monterey Mechanical Company, Oakland, CA.

# AIR QUALITY

NAME
Robert Sarvey

PURPOSE
This testimony addresses CEC Staff's position on road paving as a source of emission reduction credits in two recent siting cases the EAEC and the Tesla Power Project.

QUALIFICATIONS
I am currently an intervenor on the Tesla Power Plant and the EAST Altamont Energy Center and have first hand knowledge of CEC staff's position on road paving as a method of producing Emission Reduction Credits for PM-10 in both **recent** siting cases. I have intervened on three projects the Tracy Peaker Plant, the EAEC and the Tesla Power Plant.

CEC STAFF POSITION ON ROAD PAVING CREDITS

The CEC Staff in the EAEC Siting case opposed the use of road paving credits because fugitive dust from road paving is primarily pm-10 and the emissions from the EAEC are almost entirely pm 2.5. The staff felt that PM 2.5 particles are most likely to reach deep into the lungs and be trapped for longer periods of time than the PM-10 particles contained in fugitive dust emissions from roads. This argument was supported by guidance from the California Air Resources Board. Staff was also concerned that the road paving as mitigation is not effective in the winter months when the area experiences the worst pm-10 violations because the rain and moisture in the winter already serves to suppress particulate matter during this time period. Staff also expressed concern about the location of the road paving credits. In response to staff concerns the applicant provided other PM-10 credits.

In the Tesla Project CEC Staff was concerned about the applicant using the exact same credits that the EAEC proposed. CEC staff felt that because fugitive dust emissions are not controlled in the BAAQMD that the original emissions do not qualify as a surplus. Quantification of the reductions relies on imprecise factors most notably the effects of wet weather and vigilance of dust suppression and street sweeping strategies. The emission factors from the unpaved roads cannot be source tested. Staff also noted that the life expectancy of the road paving was less than the life expectancy of the power plant and its PM 2.5 emissions. Tesla Staff also had the same concerns as

the EAEC Staff that the emissions of the power plant are primarily PM 2.5 the most dangerous form of PM-10 and that the emission reductions achieved from road paving are primarily PM-10. CEC staff again relied on CARB Guidance on this matter noting that CARB identifies only 13% of PM from road paving as PM 2.5 and that ERCs generated from road paving should only be used to mitigate impacts from new sources that generate PM from similar activities. Tesla Staff also argued that the seasonal nature of road paving emission reduction credits do not correlate well with the projects impacts. The precipitation that occurs in the winter months when most PM-10 violations occur already minimizes dust emissions from unpaved roads so the road paving has the least effectiveness during the PM-10 season.

STATE OF CALIFORNIA
State Energy Resources
Conservation and Development Commission

In the Matter of:

Application for
SMUD Consumes
Power Plant Project

**Docket No. 01-AFC-19**

**DECLARATION OF**
**Robert Sarvey**

I, RobertSarvey, declare as follows:

1. I am a resident of the State of Califronia.

2. My experience is included in my testimony.

3. I prepared the attached testimony on the Consumes Project ( California Energy Commission Docket No. 01-AFC-19 ).

4. It is my opinion that the attached prepared testimony is valid and accurate with respect to the issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed at Tracy, California on March 7 2003.

# WITNESS LIST

| TOPIC | WITNESS | TIME |
|---|---|---|
| AIR QAULITY | | |
| BACT | Mike Boyd | 30 minutes |
| CEC Staffs Current position On road paving credits EAEC And Tesla, GWF | Bob Sarvey | 15 minutes |
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Tentative Exhibit list

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EPA Comments on Three Mountain Power Project
Excerpt from CARB 2002 Almanac
Testimony of Mike Boyd
Testimony of Bob Sarvey

RE: Traffic & Transportation

March 7, 2003

To Whom it may concern;

I understand that SMUD is in the process of having a natural gas station on the south portion of the existing property of Rancho Seco. What concerns me is that SMUD is considering making the entrance to the new station off of Clay East Rd.

Are you aware that Clay East Rd is smaller that your average residential city street, approximately 22'6". The two major differences are, there is a three foot ditch on each side of the road, with no shoulders, only a road edge. The other is children. Children walk on this road in the morning, afternoon and early evening, during school days. They also use this road to get back and forth to friends riding bikes and walking. Should we not go out for summer walks, have our kids see friends or go on bike rides?

I have lived on this street during the past seven years and have seen the traffic increase. Now with the grape vineyards, all of the field workers park just off Clay East Rd. We also have horse traffic, yes horse traffic. A lot of people in this area own and ride horses, using Clay East Rd to get to the fields off Twin Cities.

I find it hard to believe that you are willing to use this 22'6" road for operations, delivery and the transportation of hazardous material and waste, down a road past numerous homes to an entrance that doesn't exist when you could use Hwy 104, which has no homes, foot traffic, or children waiting for school buses.

During the winter time the fog in this area is very heavy. Are we to believe that all of these large trucks going up an down Clay East Rd won't be a danger when people are trying to get out of their driveways to get to work, or slowing in the evening to pull into their driveways. Again this is something that would not come into play by using the already existing entrance to Rancho Seco, as there are no homes on Hwy 104 from Clay East to Rancho Seco.

I have been enforcing the California Vehicle Code, and investigating traffic collisions for 20 years, as a Police Officer / Traffic Officer. All of the information that I have received or have heard, using Clay East Rd as a route for operations and delivery of this new facility just adds up to disaster. All I can hope is that those of you making this decision, will take my past 20 years of experience with roads and peoples driving habits into consideration when I suggest that you use the already existing and larger entrance to Rancho Seco.

Respectfully Submitted;

Stephen Carillo

**Resume**

Stephen Carillo

| | | |
|---|---|---|
| April 2002 to Present | Lodi Police Department<br>SWAT Sergeant / Traffic Sergeant / Patrol Sergeant | Police Sergeant |
| July 1991 to April 2002 | Lodi Police Department<br>Canine Officer / Patrol Officer / Traffic Officer / SWAT | Police Officer |
| July 1983 to July 1991 | Marina Department of Public Safety<br>Patrol and Fire Officer | Public Safety Officer |
| January 1982 to July 1983 | Marine Department of Public Safety | Firefighter |

Testimony for witness for Kathy Peaslee

Docket # 01-AFC-19

# MOORE BIOLOGICAL CONSULTANTS QUALIFICATIONS

Moore Biological Consultants (MBC) was founded in mid-1997, with offices located in Lodi. From this location, we provide services to clients in the Central Valley, Sierra Nevada, and Coastal regions of California. Principal Diane S. Moore, M.S. has provided consulting services addressing wetlands, endangered species, fisheries, wildlife biology, impact analysis, and permitting throughout California since 1986. MBC is a biology-based firm specializing in compliance with CEQA, NEPA, Clean Water Act (CWA), and State and Federal Endangered Species Acts. MBC is a 100% Women Business Enterprise (WBE) and was certified as a WBE by East Bay Municipal Utility District (Vendor No. MOB47500).

As professional scientists with a practical perspective on the need to balance progress with environmental protection, we provide our clients with focused studies, innovative strategies, and quality work products. As members of an increasingly important profession, we operate on a basis of honesty and full-disclosure in achieving resolution of complex and controversial environmental issues. This forthright approach has allowed us to develop the excellent working relationships with planning, resource, and regulatory agencies necessary for our clients to achieve their goals in a most timely and cost-effective manner. Rather than conduct endless studies, our goal is to see your project developed.

## Principal Services:

- wetland delineations
- wetland mitigation plans
- pre-construction surveys
- endangered species surveys
- CWA permitting
- construction monitoring

## Principal Markets & Clients:

- agriculture
- development industry
- utilities (transmission lines)
- airports
- mining industry
- infrastructure (roads, bridges, levees)
- water resources development
- habitat restoration

## Principal Staff:

**Diane Moore** received a B.S. from U.C. Berkeley in 1982 and an M.S. in Ecology from U.C. Davis in 1987. Her graduate research was in fish population dynamics in the Sacramento-San Joaquin Delta. Ms. Moore has 16 years experience in the management of fisheries, wildlife, and wetland resources including inventory, impact assessment, permitting, and preparation of various environmental documents. Ms. Moore has assessed impacts of proposed development projects on aquatic and

1300 W. Lodi Ave., Suite A * Lodi, CA 95242
(209) 365-6828 * Fax (209) 365-6829

terrestrial resources, wetlands, and threatened and endangered species throughout California. She has also participated in several investigative studies for private groups, state, and federal agencies and formulated plans to optimize and restore biological resources. She was among the first set of scientists to receive a permit to conduct surveys for federally-listed fairy and tadpole shrimp, is recognized by the California Department of Fish and Game as qualified to conduct surveys for sensitive raptors.

Ms. Moore has formal training in wetland delineation and is included on the U.S. Army Corps of Engineers list of Wetland Consultants. She has conducted over 100 wetland delineations during the pa decade for development projects, ski resorts, mining projects, agriculture, airport expansion, and wetland restoration projects. Her experience includes after-the-fact delineations associated with unauthorized work in Waters of the U.S. Ms. Moore has secured permits from resource and regulatory agencies for a wide variety of public works, development, recreation and agricultural projects and is knowledgeable of all aspects of permitting work in jurisdictional Waters of the U.S. and wetlands. She has secured complex Individual Permits involving federal funding, extensive acency consultations regarding biological and cultural resources, and preparation of 404(b)1 Alternatives Analysis. Ms. Moore is recognized as an expert in wetland delineation and has served as an expert witness on cases involving vernal pools and other wetlands in local and federal courts.

**James Henke** received a B.S. from Humboldt State University in 1999. He has participated in environmental studies associated with the management of wildlife, invertebrate, and wetland resources. His experience includes planning and conducting technical studies, data analysis, and report preparation; this experience has been gained on development, energy, public works, agriculture, and research projects throughout central and northern California. Mr. Henke has experience working within both NEPA and CEQA guidelines, is knowledgeable of CWA and State and Federal Endangered Species Acts issues and has experience in evaluating potential impacts to biological resources.

Mr. Henke has formal training in wetland delineation and has conducted wetland delineations and associated threatened and endangered species surveys at numerous sites in the Central Valley and foothills. He is particularly experienced in conducting pre-construction surveys and construction monitoring, the primary focus of these activities being compliance with endangered species laws. He is recognized by the California Department of Fish and Game as qualified to conduct surveys for sensitive raptors and has supervised and/or participated in several burrowing owls relocations. While pursuing his degree in Wildlife Biology, Mr. Henke worked as a volunteer for a variety of wildlife research projects.

# MOORE BIOLOGICAL CONSULTANTS

## ** MEMORANDUM **

Date: March 10, 2003

Subject: Testimony for Kathryn Peasha: State Energy Board Docket No. 01-AFC-19

To Whom It May Concern:

I have lived in the Herald area since 1987 and have worked as an environmental consultant since 1986. I am the Principal Biologist and owner of Moore Biological Consultants, a firm specializing in wetlands and endangered species issues. My company SOQ, which includes a summary of my qualifications, is attached.

I have prepared this memorandum at the request of my neighbor, Kathryn Peasha. Although I attended an early workshop at our local elementary school and put my name on the mailing the list for SMUD's Cosumnes Power Plant project, I have only received 2 mailings during the past one and a half years, consisting only of informational fliers. The handful of "Data Responses" I have had the opportunity to review have been largely evasive in nature, often lacking any meaningful data.

I understand that the environmental review process of this project has been bifurcated at least once, which I understand is not highly unusual for energy projects. Thus, while my true expertise is biological resources, I understand that potential impacts to biological resources, which appear to be significant and possibly unmitigatable, will be addressed in the future. Regarding "bifurcation", it is difficult for me to imagine how this piece-meal approach to the environmental review process is consistent

1300 W. Lodi Ave., Suite A * Lodi, CA 95242
(209) 365-6828 * Fax (209) 365-6829

with either CEQA or NEPA, as it precludes comprehensive review and analysis of project impacts and alternatives.

My comments today focus on appropriate land uses versus inappropriate land uses Our community was historically primarily agricultural. Over the past decade, there has been notable growth in rural residential development, with most of these parcels ranging in size from 2 to about 20 acres. School buses, slow-moving farm equipment, and even livestock on the area roads are commonplace.

The proposed gas pipeline and construction access road are situated along Clay East Road, a small, lightly-traveled road lined with residences. School buses travel along this road on a daily basis. The road is only 2 lanes and may be best described as light-duty. The existing intersection of Clay East Road and Highway 104 is at a bad angle with bad visibility and has a history of traffic accidents, including roll overs. Similarly, the intersection of Clay East Road and Kirkwood Road is on the top of a hill and is plagued with visibility problems and associated accidents. Using Clay East Road as the primary construction access road is inappropriate, as there is much better and safer access directly off Highway 104. Construction vehicles will be both large and numerous, significantly compromising an already dangerous traffic situation. People in our community will likely die as a result of this project if Clay East Road is used as proposed.

The proposed lay-down area located off site and to the south of Clay East Road also seems to be an inappropriate land use. This area is a portion of a notable complex of vernal pools and seasonal wetland swales, deemed so ecologically valuable by the U.S. Fish and Wildlife Service that it has been proposed to be designated as Critical Habitat for several vernal pool plant and animal species under the federal Endangered Species Act. Using the area south of Clay East Road as the

primary construction laydown area is inappropriate, as there are already tens of acres of highly disturbed habitats, parking lots, and biologically unremarkable areas on SMUD property to the northeast of the proposed Cosumnes Power Plant site. Use of these already disturbed habitats would be an appropriate and wise land use.

Beyond these inappropriate land uses (i.e., the primary construction access road and laydown area), I have significant outstanding concerns regarding public safety, noise, visual impacts, impacts to biological resources and water quality, and further degradation of out already poor air quality. There are outstanding and possibly unmitigatable impacts in all these resource areas.

Finally, please appreciate that our community cheered when the SMUD consumers voted to shut down Ranch Seco. There was a message in that vote.

I look forward to the opportunity to testify on behalf of Kathryn Peasha and the rest of our community. Please call me at (209) 365-6828 with any questions.

Sincerely,

Diane S. Moore, M.S.
Principal Biologist

Kathryn A. Peasha
11615 Kirkwood Street
Herald, California 95638

STATE OF CALIFORNA
ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

| | | |
|---|---|---|
| In the matter of<br>SMUD Consumes Power Plant<br>Application for Certification | )<br>)<br>)<br>)<br>)<br>)<br>) | Docket No. 01-AFC-19<br><br><br>Mike Boyd's Pre-filed<br>Hearing Testimony on<br>Air Quality |

## Mike Boyd's Pre-filed Hearing Testimony on Air Quality

1. Mike Boyd of CARE herein provides pre-filed hearing testimony on the proposed SMUD Consumes Power Plant. CARE's comments are derived utilizing our database of information available to the general public at CARE's Internet site at http://www.calfree.com/Documents.htm.

## Introduction

2. CARE sincerely thanks the CEC, for patience in dealing with lay members of the general public, who, at most, can only afford a relatively small amount of competent legal guidance and representation. We sincerely regret any inconvenience we have caused in our often-frustrating effort to participate in and lend public legitimacy to these CEC proceedings. The inconvenience from our failure to properly follow your procedures and regulations, the complexity and technical nature of which obviously require legal and other expert assistance, is

not only regrettable but serves to further point out the public's desperate need for appropriate expert, professional and technical assistance.

3. The Clean Air Act establishes national ambient air quality standards (NAAQS). CAA §§ 107, 160-169(b), 42 U.S.C. §§ 7407, 7470-7492. NAAQS are currently in effect for six pollutants: sulfur oxides (measured as sulfur dioxide ("SO2"), particulate matter ("PM"), carbon monoxide ("CO"), ozone (measured as volatile organic compounds ("VOCs")), nitrogen dioxide, and lead. 40 C.F.R. § 50.4-.12.

4. In areas classified as "attainment" for any of these pollutants, air quality meets or is cleaner than the NAAQS for that pollutant. CAA § 107(d)(1(A)(i), 42 U.S.C. §7407(d)(1)(A)(i). In "unclassifiable" areas, air quality cannot be classified on the basis of available information as meeting or not meeting the NAAQS. CAA §107(d)(1(A)(iii), 42 U.S.C. § 7407(d)(1)(A)(iii).

5. In areas that are in attainment or unclassifiable with respect to NAAQS, parties must obtain preconstruction approval in the form of a PSD permit before building new major stationary sources or making major modifications to existing sources. CAA §§ 107, 160-169(b), 42 U.S.C. §§ 7407, 7470-7492. Applicants for PSD permits must demonstrate, through analyses of the anticipated air quality impacts associated with their proposed facilities that the facilities' emissions will not cause or contribute to an increase in regulated pollutants such that the pollutant exceeds the NAAQS in the area. CAA § 165(a)(3), 42 U.S.C. § 7475 (a)(3); 40 C.F.R. §52.21(k)-(m).

6. The proposed site of the SMUD Consumes Power Plant facility approximately 0.5 miles south of the Rancho Seco Nuclear Plant (currently undergoing decommissioning), 25 miles southeast of the City of Sacramento, in Sacramento County, is an area currently designated as non-attainment for the federal PM10 and ozone standards, and attainment for the federal SO2, CO, and

NO2 standards. Staff found that the project's emissions have the potential to cause significant impacts relative to the state 24-hour PM10 (particulate matter less than 10 microns in diameter) air quality standard. In addition, the project would also contribute to existing violations of the recently promulgated federal 8-hour ozone and 24-hour PM2.5 standards. As proposed, the facility has the potential to emit all of these pollutants in quantities sufficient to trigger the PSD regulations. These regulations require that new major pollutant-emitting facilities and major modifications of such facilities employ the "best available control technology," or BACT, to minimize emissions of pollutants regulated under the Clean Air Act. CAA § 165(a)(4), 42 U.S.C. § 7475(a)(4); 40 C.F.R. § 52.21(j)(2). The Clean Air Act and its PSD regulations define BACT as an emissions limitation . . . based on the maximum degree of reduction for each pollutant subject to regulation under [the CAA] which would be emitted from any proposed major stationary source. Which the [EPA] Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and costs, determines is achievable for such source. CAA § 169(2)(C)(3), 42 U.S.C. § 7479(2)(C)(3); 40 C.F.R. § 52.21(b)(12). Under the rules governing the PSD permitting process, the permit applicant must provide a detailed description of the proposed system of emissions reduction and any other information necessary to ensure that BACT is applied. 40 C.F.R. §52.21(n)(1)(iii). The permitting authority makes the ultimate BACT decision, in this case the CEC.

7. The CEC Staff's as well as the Sacramento Metropolitan Air Quality Management District (District) analysis of the SMUD Consumes Power Plant has flaws in its Top-Down BACT analysis for NOx based on information over two years old. The District's Rule 202

> Rule 202 Requires that a source be subject to a New Source Review (NSR) process if it is a new or modified stationary source. The NSR process includes an evaluation of Best Available Control Technology (BACT), an air quality impact analysis, and emission offsets.

8. The FSA failed to even consider the option of SCONOx emission control technology. CARE provides exhibit Air-1 titled *NOx Abatement Technology For Stationary Gas Turbines An Overview of Selective Catalytic Reduction (SCR) And Catalytic Absorption (SCONOx™) Systems by* Mike Mariscalco, P.E. of QEI Engineers, as an offer of proof of this technology's availability and approval in practice.

9. CARE points out below that the CEC is acting arbitrarily and capriciously by allowing emissions of NOx and CO in excess of levels that can be accomplished through a proper application of BACT. Based on the comments of Coyote Valley Research Park (CVRP) in the Metcalf Energy Center case, it is clear that SCONOx can achieve a NOx emission limit of 1.3 ppm @ 15% O2 averaged over 1 hour with no ammonia slip.

10. However, the CEC has once again chosen a BACT for NOx that allows pollution – 2.0 ppm @ 15% O2 averaged over 1 hour using dry low NOx combustors and SCR. The CEC is acting arbitrarily and capriciously in doing so.

**SCONOx is Both Applicable and Available to This Facility**

11. The US-EPA Environmental Appeals Board has held that "an agency should reject the more environmentally protective technology only if the record demonstrates clearly that it is inapplicable or not available to a particular case." In Re Masonite Corp., 5 E.A.D. 551, PSD Appeal No. 94-1(EAB November 1, 1994). SCONOx is clearly the more environmentally protective technology, in that it achieves lower emissions levels of both NOx and CO, reduces PM10[1] formation due to the elimination of ammonia slip, and reduces emissions of toxic pollutants.

[1] PM10 is "particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers" 42 U.S.C. 7602(t).

12. Furthermore, SCONOx is both applicable and available in this case. The NSR Manual provides that a technology is "applicable" to a facility "if it has been or is soon to be deployed (e.g., is specified in a permit) on the same or similar source type." NSR Manual at B.18. Several permits specifying SCONOx have been issued to large gas turbine facilities similar to this project, as demonstrated in CVRP's comments. Thus SCONOx is "applicable." SCONOx is also "available" for this type of facility as it is currently being offered for sale with performance guarantees "specifically targeting the largest gas turbines made."

**SCONOx is Technically Feasible for This Facility**

13. As a delegate of the EPA, the CEC must comply with the requirements of 40 C.F.R. 52.21 and 40 C.F.R. 124. In Re: West Suburban Recycling and Energy Center, PSD Appeal Nos. 95-1 and 96-1 (EAB, Dec. 11, 1996). The CEC must also follow the EPA's new source review guidance, including the New Source Review Workshop Manual (Draft Oct. 1990) ("NSR Manual"). According to the NSR Manual, before a technology may be eliminated for infeasibility:

> The applicant should make a factual demonstration of infeasibility based on commercial unavailability and/or unusual circumstances which exist with application of the control to the applicants' emission units. Generally, such a demonstration would involve an evaluation of the pollutant-bearing gas stream characteristics and the capabilities of the technology.

NSR Manual at B.19. The NSR Manual is clear that

> Demonstration of technical infeasibility is based on a technical assessment considering physical, chemical and engineering principles, and/or empirical data showing that the technology would not work on the emissions unit under review, or that irresolvable technical difficulties would preclude the successful deployment of the technique. Physical modifications needed to resolve technical obstacles do not in and of themselves provide a justification for eliminating the control technique on the basis of technical infeasibility.

NSR Manual at B.20.

14. Where, as here, a control technology has been applied to only a limited number of sources, the NSR Manual provides an opportunity for the applicant to demonstrate that the technology should not be required for its facility. It directs that the applicant may:

> Identify those characteristic(s) unique to those sources that may have made the application of the control appropriate in those case(s) but not for the source under consideration. In showing unusual circumstances, objective factors dealing with the control technology and its application should be the focus of the consideration. The specifics of the situation will determine to what extent an appropriate demonstration has been made regarding the elimination of the more effective alternative(s) as BACT. In the absence of unusual circumstances, the presumption is that sources within the same category are similar in nature, and that cost and other impacts that have been borne by one source of a given source category may be borne by another source of the same source category.

NSR Manual at B.29.

15. The CEC has not made the required demonstration, responsive to this guidance that proves SCONOx infeasible for the SMUD facility. Instead, the CEC in other siting cases simply dismissed SCONOx as technically infeasible based on a misreading of the Stone and Webster report. This explanation is inadequate, Alstom Power released a document in June 2001 specifically addressing the references in the Stone and Webster report and showing that (1) the problems were never significant, and (2) even these problems have now been eliminated. See June 7, 2001 paper from Alstom Power re: Independent Technical Review of the SCONOx Technology and Design Review as Reported by Stone & Webster Management Consultants, Inc.

16. As the Alstom paper shows, Alstom is now offering the SCONOx technology – with performance guarantees – to all owners and operators of natural gas-fired combined cycle combustion turbines, regardless of size or OEM. Furthermore, EPA has stated unequivocally that SCONOx is technically feasible for large combined cycle projects such as this one. The South Coast Air

Quality Management CEC has also concluded that: the SCONOx control technology can be scaled up in comparison to the 32MW demonstration plant since the exhaust characteristics of the turbines are similar. Based on staff review of AQMD source test reports for different turbines, staff finds that the NOx reduction process and the characteristics of the exhaust gases from natural gas fired turbines are similar regardless of size above 3 MW.

17. This position is echoed throughout the documentation supporting the SCAQMD's BACT/LAER determination that is currently used throughout California. The record is replete with authoritative evidence that: "[t]here is no known technical limitation that would render the exhaust flue gas of a large industrial turbine to have different characteristics than exhaust from a 30 MW aeroderivative turbine;" and "[s]ince there is no known technical reason that will render the exhaust flue gas from a large gas-fired turbine to have different characteristics than exhaust from a 30 MW turbine, AQMD staff has concluded that LAER, as presented in the Staff Report, must apply to gas turbines over 3 MW size."

**The CEC's Analysis Did Not Include the Lowest NOx Limit**

18. The CEC did not properly carry out the third step of the top-down BACT analysis required by the NSR Manual. In the third step, the CEC is to rank all remaining control technologies by control effectiveness, with the most effective at the top. A key question at this level is "How should control techniques that can operate over a wide range of emission performance levels . . . be considered in this analysis?" NSR Manual at B.22. The NSR Manual answers: "the applicant should use the most recent regulatory decisions and performance data for identifying the emissions performance level(s) to be evaluated in all cases." NSR Manual at B.23.

19. The NSR Manual provides some latitude to consider special circumstances, if the basis is "documented in the application." Id. In the absence of a showing of differences between the proposed source and previously permitted sources achieving lower emissions limits, the permitting agency should conclude that the lower emissions limit is representative for that control alternative. NSR Manual at B.23.

20. As discussed above, the CEC entirely ignored recent regulatory decisions and performance data placed in the record by CVRP in Calpine's MEC project, and refused to perform its own analysis of the relative performance levels achievable by the different control technologies. The CEC's failure to conduct this analysis constitutes clear error. Had the CEC conducted this analysis, the result would have been to establish a NOx limit that is lower than the limit contained in the permit.

**The Collateral Environmental Impacts of SCR Were Not Adequately Evaluated**

21. Selective Catalytic Reduction ("SCR"), the technology selected by the CEC as BACT, requires the use of ammonia. Some of this ammonia, termed "ammonia slip" or simply "slip," is emitted into the atmosphere, where it can form secondary PM10. Secondary PM10 results from precursor emission (e.g., NOx, SO2, ammonia, organics) that undergo physical processes and chemical reactions in the atmosphere, as opposed to direct, primary PM10 emissions formed during combustion. Secondary PM10 is very fine particulate matter of the size largely responsible for health effects attributable to PM10, and causes visibility impairment.

22. The CEC Staff's as well as the Sacramento Metropolitan Air Quality Management District (District) analysis of the SMUD Consumes Power Plant

clearly identifies the flaws in the analysis of collateral impacts of SCR which are required to be mitigated under CEQA (FSA 1 at 7.1-8).

> In a study by Nehzat Motallebi (Motallebi, 1998), the following observations are drawn from the application of Chemical Mass Balance analysis of the Sacramento PM10 and PM2.5 measured data.
>
> - Primary vehicle exhaust and wood smoke are significant sources of both PM10 and PM2.5 in winter.
> - Nitrates, a secondary formed fine particulate matter from the complex reaction of NOx and ammonia in the atmosphere, are the major cause of high PM2.5 and PM10 level during the winter months.
> - Sulfates, a secondary formed fine particulate matter from the reaction of SOx and ammonia in the atmosphere, are also a major contributor to high PM2.5 level during the winter months.
> - Fugitive dust is not a major contributor to the peak PM10 and PM2.5 levels in Sacramento.

**23.** Secondary PM10 is a significant environmental impact of SCR, under CEQA and the CAA, and must be evaluated in a BACT analysis. CARE maintain that where two technologies provide equivalent control for a regulated pollutant, but one would also control pollutants not directly regulated by the PSD program, the one controlling the unregulated pollutants should be chosen as BACT. In response to previous comments from CARE in the MEC project, the CEC lowered the allowable ammonia slip from 10 ppm to 5 ppm, while this is a step in the right direction, it fails to mitigate all the significant collateral environmental impacts of SCR, and falls far short of the complete mitigation available through the use of SCONOx, that we contend is required by the CAA and CEQA.

## The CEC Failed to Require BACT for CO Startup and Shutdown Emissions

24. Moreover, as EPA Region IX noted, SCONOx has the collateral benefit of controlling CO and VOC emissions. Furthermore, SCONOx and an oxidation catalyst can control emissions of toxics and VOCs (or as the FSA refers

to as "POCs"). CARE pointed out in the MEC case that toxic emissions such as formaldehyde, acrolein, benzene, toluene, methane, and non-methane hydrocarbons are especially problematic during facility startup and shutdown operations. CARE Petition (MEC EAB Dkt. 2) at 24-25. A CVRP expert testified to the California Energy Commission in the MEC case that toxic emissions calculations during these operation modes were based on flawed data and assumptions and is much higher than previously estimated. See Group 3B Testimony on Air Quality and Public Health, submitted by CVRP to CEC on February 13, 2001 (STCAG Petition (MEC EAB Dkt. 1), Exhibit M).[2] CEQA requires the CEC's consideration of collateral benefits, and the CEC's failure to consider SCONOx further, in light of its availability, feasibility and effectiveness, is in clear error.

25. The FSA contains no concentration-based (ppm) BACT limit for CO except for full load operations. The NSR Manual is clear that "BACT emission limits or conditions must be met on a continual basis at all levels of operation (e.g., limits written in pounds/MMbtu or percent reduction achieved), demonstrate protection of short term ambient standards (limits written [as] pounds/hour) and be enforceable as a practical matter . . . ." NSR Manual at B.56. The California Air Resources Board has also stated that startup and shutdown emissions should be subject to BACT analyses. However, the CEC failed to establish limits and compliance procedures that would accomplish this goal. The CEC's sole response to CVRP's comments in the MEC project was that it is "not possible for the turbines to comply with their BACT emission limitations during start-up [and shut-down]." CVRP further provided documentation of several different available controls "that could be used to satisfy BACT and reduce startup and shutdown emissions." As discussed above, the CEC completely failed to respond to this

[2] Before the Board, Calpine/Bechtel argued that this testimony was "extrarecord" evidence that was not available to the CEC when it initially issued the FDOC, and had not been included in the Administrative Record. The Board concluded that this testimony before the CEC constituted the parties' first opportunity to submit their views on the CEC's top-down BACT analysis, and elected to treat the testimony as "part of the administrative record for this case."

comment and continues to fail to properly analyze BACT for CO startup and shutdown emissions for the SMUD.

26. The EAB acknowledged in CARE's MEC appeal that the CEC had entirely failed to respond to three "instances" of comments made by CVRP".[3] These instances were (1) challenges to the technical conclusions of the Stone & Webster Report, upon which the CEC primarily relied in finding SCONOx to be technically infeasible; (2) comments that permits had been issued in both Massachusetts and Connecticut, establishing NOx BACT for large gas turbines at 2 ppmvd @ 15% O2 averaged over one hour; and (3) identification of thirteen source tests for combined-cycle plants showing that "BACT for CO for large combined cycle gas turbines in merchant operation is no more than 2 ppmvd @ 15% O2 averaged over 1 hour." Id.

27. The FSA has concluded that BACT for CO is an emission limit of 6 ppm a high-temperature oxidation catalyst system if the project cannot meet the proposed CO emissions of 6 ppm. Other projects have been approved with 4-ppm emission limit. Therefore this is not in compliance with the Clean Air Act and CEQA. This BACT determination suffers from the same problems already discussed for NOx, namely: (1) it improperly eliminates SCONOx, the most effective control technology; (2) it fails to consider lower limits required in other permits; and (3) it fails to consider lower limits demonstrated by performance data. Accordingly, the CEC's failure to comply with the Clean Air Act's BACT requirements for CO warrants further review of such.

**CEQA requires reading and evaluating a certified EIR or its functional equivalent prior to determining compliance**

[3] Although CVRP was not a petitioner in CARE's MEC EAB appeal, issues raised by another party during the public comment period may be raised by petitioners, even if the petitioner did not raise the issue in his

28. The Delegation Agreement between the Sacramento Metropolitan Air Quality Management District and EPA Region IX requires the CEC to comply with the CEQA EIR requirement by reading and evaluating a certified EIR or its functional equivalent before issuing a permit. The CEC has failed to comply with this requirement instead choosing to issue the Determination of Compliance (and presumably the PSD permit) before receiving or reading the EIR or its equivalent. These CEC and Sacramento Metropolitan Air Quality Management District actions are arbitrary and capricious and CARE herein protests and objects to you doing so. CEQA Applies to the District's Issuance of a PSD Permit Under Authority Delegated by the EPA as well.

29. Sections 21061, 21100 and 21151 of the California Public Resources Code require every public entity that proposes to approve a discretionary activity or "project" that may significantly affect the environment to read and consider the project's environmental impact report ("EIR").[4] An EIR is required to be prepared, or caused to be prepared, and certified by any state or local agency for any project they intend to carry out or approve which may have a significant effect on the environment.[5] Only one EIR need be prepared and where a project requires multiple approvals by various state and local agencies, one agency becomes the project "lead" agency[6] and the other agencies are "responsible" agencies.[7] The EIR is prepared by the "lead" agency, and reviewed and considered by the other "responsible agencies approving the project. In this action, CEC is the lead agency and the CEC is a responsible agency; therefore CEC is required to prepare the EIR first. Under the CEQA Guidelines, 14 C.C.R.

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or her own comments. The issue must simply have been raised by "some party" during the comment period. 40 C.F.R. §124.13.

[4] ". . . An environmental impact report is an informational document which, when its preparation is required by this division, shall be considered by every public agency prior to its approval or disapproval of a project." Pub. Res. Code §21061.

[5] Pub. Res. Code §§ 21100, 21151.

[6] "Lead Agency" is "the public agency which has the principal responsibility for carrying out or approving a project which may have a significant effect on the environment." Pub. Res. Code § 21067."

[7] A "responsible agency" is "a public agency, other than the lead agency, which has responsibility for carrying out or approving a project." Pub. Res. Code §21069.

section 15000, et seq., the CEC licensing process serves as a "functional equivalent" of an EIR.[8]

Michael E. Boyd

President-CARE (831) 465-9809 DATED: March 10, 2003

[8] 14 C.C.R. § 15251(k).

**DECLARATION OF**

**Michael E. Boyd**

I, Michael E. Boyd, declare as follows:

1. I am presently the President of CAlifornians for Renewable Energy, Inc. (CARE) located in Santa Cruz County California California.

2. I have a Bachelors of Science in Physics from the University of California at Santa Barbara and am employed as an engineer and scientist in the electronics industry.

3. I have participated as a formal Intervenor and provided written and oral testimony at eight different CEC power plant project sitings.

4. I have prepared the Pre-filed Hearing Testimony on Air Quality for the proposed SMUD Consumes Power Plant.

3. I am qualified to provide expert testimony and act as an expert witness for Kathryn A. Peasha in regards to Air quality during the hearings and on subsequent enforcement action on the SMUD Consumes Power Plant.

4. It is my professional opinion that the SMUD must prepare an independent Environmental Impact Report that includes a more extensive analysis of impacts, additional mitigation, and analysis of alternatives for environmental effects from the proposed project.

6. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

DATED: March 10, 2003 Signed: Michael E. Boyd

# Resume of Mike Boyd

michaelboyd@sbcglobal.net
Michael Boyd
821 Lakeknoll
Sunnyvale, CA 94089
Cell: 408-891-9677
Phone: 831-465-9809

**Employer:** Aspect Communications
**Title:** Electronics Design Engineer
**Salary Desired:** Negotiable
**Travel:** Light (<25%)
**Work Type:** Any
**Available:** Now
**Active/Passive:** Active
**Citizenship:** US Citizen
**Security:** Yes
**Last Updated:** 1-27-2002
**Degree:** B.S. Physics

Objective

A position as a technical engineer or manager utilizing my educational background, and eighteen years work experience in the microelectronics, telecommunication, semiconductor, and hard drive industry.

Employment Experience

11/99 – 02/02 ---- Aspect Communications

Component Engineer, Manufacturing Engineering: responsible to support all vendor supplied components and assemblies in accordance with established processes and requirements. This support is defined as follows:

· The AML is maintained and kept current with all vendor information and necessary requirements
· Establish and maintain a process to provide adequate and timely notice/knowledge in reference to all component obsolescence.
· First line of defense in providing for material obsolescence resolution
· Establish and maintain a process to closely track single sourced material. A single source list will be created and routinely disseminated to procurement. This list will be used to insure adequate inventory is maintained for this key material.
· All AML related IRFs (Item request Forms) are to be approved by the component engineer for:
· Establish and maintain a process to insure all users of the AML have contemporaneous informati
· Provide a resource to development engineering, sustaining engineering, and procurement in the role of assisting with component issues/identification
· Provide component analysis and resolution in relation to product failure (increased quality)
· Creation and Submission of Engineering Change Orders (ECO) and Manufacturer Change Orders (MCO) utilizing the Agile database.
· Validation of programmable parts.
· Reduce costs through strategic and planned identification of alternate components

2/99 – 11/99 -----the Watt Stopper Inc.
(Occupancy sensors for energy savings, including passive IR, ultrasonic, and light level sensor. These consumer products incorporate ASIC and Micro controller based technologies.)

Test Engineer, Advanced Manufacturing: Development of test fixtures for opt electronic, ASIC, and Micro controller based product characterization. Software development for various automated electronic test apparatus to perform data acquisition, data logging, and data reporting. Prepare failure analysis, and reports as required for returned goods.

Skill used include:
·Programming (basic, machine coding, C)
·Circuit modeling, and test fixture fabrication
·Electronic trouble shooting
·Multiplexed data acquisition
·EAGLE circuit design, digital, analog, mixed signal and opt electric components

9/96 - 11/98 ----- Phase Metrics, Fremont, Ca. (Major supplier of hard disk industry's component testers. These include head media certifiers, fly height testers, head testers, and optical inspection equipment).

Engineer-Scientist, Customer Support/Standards: Group reviews new products for design flaws prior to release, and designs and qualifies magnetic media, glide, and optical inspection equipment standards.

Skill used include:
·Programming (Visual Basic)
·Design and fabricate standards disks for calibration and correlation of optical inspection to piezo-glide and certification errors.
·Electronic trouble shooting to discover design flaws in certification tester, and optical inspection equipment.
·Prepared system test plan for optical inspection equipment
·Prepared Final Acceptance Test procedures for optical inspection equipment
·Provide training for field engineers, and manufacturing technician, to transition new products to production.
·Customer training and demonstration of new products
·Prepared and published paper on MR Glide using the MR transducer to detect and classify defects on the media surface
·ORCAD circuit design
·Operation of various test equipment including scanning tunneling microscope or Atomic Force Microscope (AFM), Magnetic Force Microscope (MFM), spectrum analyzers, oscilloscopes, arbitrary waveform generators, etc.
·Operation of various disk testers including MC900, MG250 certifiers, IBM ODA, and PS5100.

5/93 -9/96 Exempt Present Consultant ----- Qualified Parts Laboratory,
Sunnyvale, Ca. (qualifies parts for government, industrial, and space applications) QML Certified.

Test Engineer, Electronics Characterization Area: Development of test fixtures for electronic device characterization. Software development for various automated electronic test apparatus to perform data acquisition, data logging, and data reporting. Preparation of test plans according to specific

military application e.g.; MIL-STD-883, 202, etc.

Skill used include:
·Programming (basic, Fortran, machine coding, C)
·Circuit modeling, and test fixture fabrication
·Electronic trouble shooting
·High Voltage Dielectric Withstand & Insulation Resistance Testing
·RF amplifier, MMIC, filter, and switch testing 1MHz-2.1GHz
·Multiplexed data acquisition
·IBM PC Network (LAN) and Database Administration
·ORCAD circuit design for RF, digital, analog, mixed signal components
·Residual gas analysis certification engineer utilizing Mass Spectroscopy
·Environmental Laboratory Supervisor

5/82-11/91 ----- Santa Barbara Research Center (subsidiary, Hughes Aircraft Co.)

Senior Development Engineer, Detector Division: Reported to head of characterization section and performed special projects for the Materials Department Manager. Responsible for monitoring and improving IR-detector fabrication process. Responsible for materials purity control monitoring. Providing technical inputs for proposal activities.

Skills used included:
·Software development for analysis of data collected from automatic data acquisition systems. Languages: Fortran, UNIX "C", FLEXTRAN. HPL, basic, and assembly code.
·Interfaces developed for data transfer between Mac to HP, IBM, and VAX computer systems.
·Implementation of statistical process control (SPC) techniques in the material growth and detector array fabrication process line.
·Design and development of optical and electrical characterization apparatus. Analytic results from these apparatus were published in scientific journals (See Publications)
·Optical and electrical characterization of a wide variety of insulator, superconductor, and semiconductor materials utilizing cryogenic microprobe technology of IR detectors, MISFET, Focal Plane Gated Arrays (FPGA) and other semiconductor devices.
·X-ray diffraction, X-ray Fluorescence Spectroscopy, scanning electron microscope (SEM) analysis including Wavelength and Energy Dispersive (WDX & EDX) analysis.

Education
1985 B.S. Physics, University of California at Santa Barbara, undergraduate emphasis electronics, microprocessor design, and material sciences.

1988, Independent research at U.C.S.B., with Dr Carl Ramsayer to examine the feasibility of the use of an IR-Detecting Cathode Luminescence Spectral Radiometer to measure Cathode Luminescence effect in Oxide and Carbonate materials at low electron beam acceleration voltages.

1991 U.C.S.B. Concurrent Enrollment M.S. Program Materials
Sciences

Security Classification
Secret

Professional Affiliations

Member International Society for Optical Engineering (SPIE)
Member Union for Concerned Scientists (UCS)

Community (volunteer) activities
1/80 - 12/92 Director (founding) President Let Isla Vista Eat, Inc. (LIVE) Non-profit Corp.
12/82 - 6/89 President (elected)-Isla Vista Community Council/Municipal Advisory Council
12/84 - 12/92 Director (elected)-Isla Vista Recreation & Park CEC
12/89 - 12/91 Director -First VP California Recreation & Park CEC Association
12/89 - 12/91 Director - Santa Barbara County Special CECs Association
12/89 - 5/93 Director (elected) Goleta West Sanitary CEC
12/96 -12/98 Commissioner Sunnyvale Housing & Human Services Commission
9/99 - Present President (founder) CAlifornians for Renewable Energy, Inc. (CARE) non-profit

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(References provided upon request)

# NOx Abatement Technology For Stationary Gas Turbines

## *An Overview of Selective Catalytic Reduction (SCR) And Catalytic Absorption (SCONOx™) Systems*


**ABSTRACT**

Non attainment areas in the US, where new stationary gas turbines installations require Lowest Achievable Emission Rate (LAER) technology for NOx control, have now an option between two competing NOx control technologies: Selective Catalytic Reduction (SCR) and Catalytic Absorption (SCONOx™). SCR involves the catalytic removal of NOx in the turbine exhaust gas using ammonia as the reducing agent. SCONOx™ requires no ammonia and involves the chemisorption of NOx compounds on a catalyst sorber/material. This NOx is subsequently reduced during a regeneration cycle using a mixture of steam and dilute hydrogen gas produced from the turbine fuel and steam. SCONOx™ is a patented technology of EmeraChem LLC, Knoxville, TN.

In the power industry SCR (which requires a separate catalytic system for CO and VOC destruction) is considered to be a mature and generally accepted method of NOx control. SCONOx™ (a multi pollutant control technology which does not require an additional system for CO or VOC destruction) is regarded as a newer technology demonstrated to achieve NOx control as low as 0.5 ppm and has been recognized as a LAER technology by the United States EPA. In those areas where ammonia emissions are also required to be minimal, SCONOx™ has been promoted or specified as the only technology available for ammonia free NOx control.

Of particular note, SCR performance is known to vary significantly with incoming ppm NOx concentration levels and exhaust gas flow changes associated with load following as well as ammonia distribution. New generation Dry Low NOx combustors (DLNC) produce NOx concentrations of less than 10 ppm. The control of NOx to 2 ppm (or lower) in these situations using SCR requires higher catalyst volumes and results in higher ammonia usage rates relative to the inlet NOx concentration (ammonia slip - a known precursor to Particular Matter formation) which must be controlled, subsequently affecting NOx reduction. Conversely, SCONOx™ performance is known to vary only with catalyst volume.

Within the power industry, the debate involving the two technologies is one that focuses primarily on cost and technical feasibility. The SCONOx™ technology is typically the more expensive option, and regarded incorrectly by some as technically infeasible for large applications. The body of information available for the two technologies suggests a number of important conclusions that can be summarized as follows:

1. SCONOx™ technology has demonstrated NOx reductions below 2.0 ppm, and often below 1.0 ppm, in commercial applications.
2. SCONOx™ is a "technically feasible" NOx abatement technology for LAER applications in the 5 to 500 MW range, and can be considered as an "available" technology due to its modular design and scalability. Currently, SCONOx™ is in use or permitted for use on 659 MW of power generation.
3. SCR technology has not been demonstrated to achieve NOx reductions below 2.0 ppm and should therefore not be considered as either "technically feasible" or "available" for those applications.
4. SCR cannot be reasonably applied to NOx control when it is necessary to minimize ammonia emissions, especially where DLNC turbines are involved. SCONOx™ has no ammonia emissions regardless of the application.
5. SCONOx™ technology can be furnished to recover 80% or more of its spent regeneration steam, if required.
6. Where applicable, SCONOx™ enables the generation of Emission Reduction Credits (ERC's) for resale thus reducing the total life cycle cost of the pollution abatement system.
7. Contrary to SCR, the SCONOx™ catalyst is not considered a hazardous waste material at the end of its useful life. In contrast, the SCONOx™ catalyst holds a residual value based on the value of the precious metals (Platinum) present on the catalyst, as opposed to being disposed as a hazardous waste.

## LOWEST ACHIVEABLE EMISSION RATE

In areas that have been classified as "non-attainment" for NOx, new NOx sources must be capable of demonstrating "Lowest Achievable Emission Rate" (LAER) as defined by the USEPA. The USEPA defines LAER, for any source, as either of the following:

a) The most stringent emissions limitation which is contained in any state SIP for a class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or

b) The most stringent emissions limitation which is achieved in practice by a class or category of stationary source

Unlike "Best Available Control Technology" (BACT), which considers issues of cost, LAER does not consider cost, but instead considers only whether an emission limitation is achievable. The current Federal LAER standard for NOx in gas fired turbine/electric-

generating plants is 2.0 ppm, using a 3 hour rolling average. The State of Massachusetts has recently adopted a more stringent standard, which can be as low as 1.5 ppm.

## SELECTIVE CATALYTIC REDUCTION (SCR)

As the name implies, Selective Catalytic Reduction (SCR) involves the reduction of NOx compounds in the gas stream to nitrogen gas and water vapor by means of a chemical reaction through a catalyst. As indicated in Figure 1, hot turbine exhaust gases are first injected with a spray of aqueous ammonia ($NH_3$). The gases then flow over a catalytic material to facilitate the chemical reaction. In the presence of this catalytic material, the nitrogen and hydrogen in the ammonia combine with the nitrogen and the oxygen respectively in the NOx to produce only nitrogen gas ($N_2$) and water vapor ($H_2O$). The process requires that the ammonia supply be continuously adjusted, based upon the measurement of incoming and outgoing NOx concentrations. SCR can be applied to either natural gas or oil fired combustors, but requires an additional catalyst system for the destruction of CO and Volatile Organic Compounds (VOC).

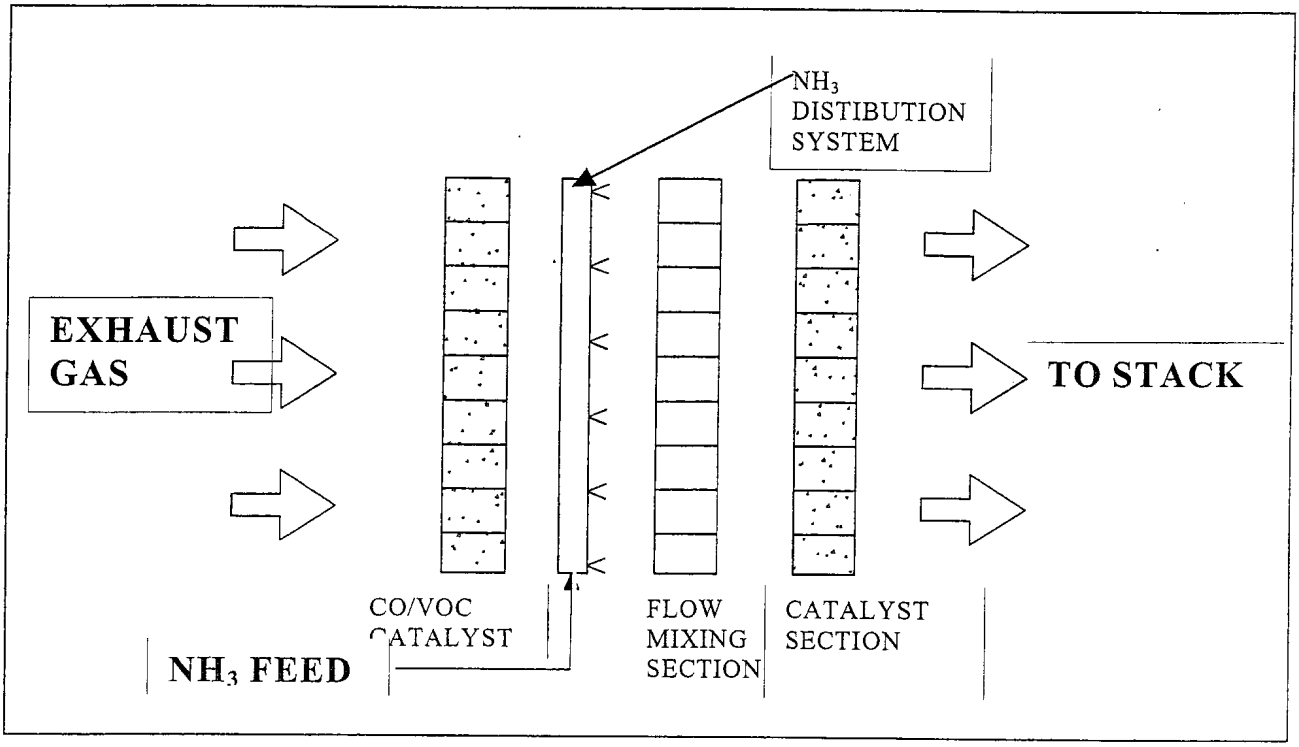


**Figure 1 – Typical SCR NOx Abatement System**

The introduction and distribution of ammonia in the exhaust gas are critical to NOx removal in SCR systems. Because of mechanical mixing considerations, $NH_3$ must be supplied to the exhaust gas in amounts that exceed the stoichiometric requirement. This excess supply is known as "ammonia slip", which subsequently becomes an additional source of air emissions for the plant. The unreacted amounts of ammonia or ammonia slip can react with the sulfur present in the turbine exhaust gas and the uncontrolled NOx to produce particulate matter that can fowl boiler tubes and can be emitted to the surrounding areas to create small respirable airborne pollutants which are of particular health concern. Historically, SCR NOx control has been demonstrated to be effective for NOx inlet concentrations of 15- 25 ppm, when 2-10 ppm of $NH_3$ slip can be tolerated. However, SCR control for low inlet NOx and low $NH_3$ slip is known to be problematic.

In general, the $NH_3$/ NOx molar ratio depends on the amounts of NO and $NO_2$ present in the exhaust gas. There have been documented at least five (5) possible reactions that take place between $NH_3$ and NOx and the theoretical ratios vary from 0.66 to 2. While SCR system suppliers recommend or target a 1:1 ratio, SCR system operation is highly unpredictable due to changes in temperature and upstream surface exposure of the exhaust. It has been the experience of SCR operators that excess $NH_3$ is required to compensate for the unpredictable chemical stoichiometry and difficulties in uniform $NH_3$ mixing. Both high NOx removal efficiencies and low ammonia slip limits have not been demonstrated with SCR for low inlet NOx concentrations.

In theory, even if SCR could meet a 2 ppm $NH_3$ emission limit, a 500 MW cogeneration facility would still emit 45 tons per year or more of ammonia, clearly against the desires of those regions where airborne $NH_3$ is regulated under an Air Toxic Policy.

## CATALYTIC ABSORPTION (SCONOx™)

Catalytic Absorption, a patented process of EmeraChem, LLC, is more commonly known as SCONOx™. Unlike SCR, SCONOx™ is a multi-pollutant-based catalyst that removes CO and VOC, while simultaneously absorbing NOx on a propriety catalyst sorber. This sorber must be periodically regenerated using a superheated steam/dilute hydrogen gas mixture which is produced on site and in an "on demand" basis, using the same fuel utilized by the turbine. The regeneration process results in the chemical reduction of NOx compounds to water vapor and nitrogen, as well as several interstitial compounds which remain on the catalyst and are essential to is chemistry.

Catalyst regeneration is critical for NOx reduction performance, and must be continuously conducted in an oxygen free environment. To accomplish this task, the system is furnished in arrays of 5-module catalyst sections (Figure 2), with each module having an inlet and outlet damper section. During operation, 4 of the 5 modules in each section are actively on-line (with dampers open) absorbing NOx and oxidizing CO and VOCs (Volatile Organic Compounds) to $CO_2$ (Carbon Dioxide) and $H_2O$ (Water), while the $5^{th}$ module operates in the regeneration mode with its dampers closed. Spent regeneration steam is either discharged directly into the stack, or is condensed and returned to the steam plant for reuse. NOx concentrations can be affected by adjusting the regeneration cycle time, and the technology can be applied to either gas or low sulfur oil fired combustors.

While this modularization feature makes the technology amenable for use over wide ranges in size (large applications are multiples of smaller applications), the costs associated with the mechanical installation (piping, valves, controls, etc.) also make the technology expensive, which generally confines its use to either LAER, or $NH_3$ limited applications. $NH_3$ emissions resulting from the use of SCR and community awareness for the elimination of the discharge of $NH_3$ into the environment has been highlighted as an important feature promoting the use of SCONOx™.

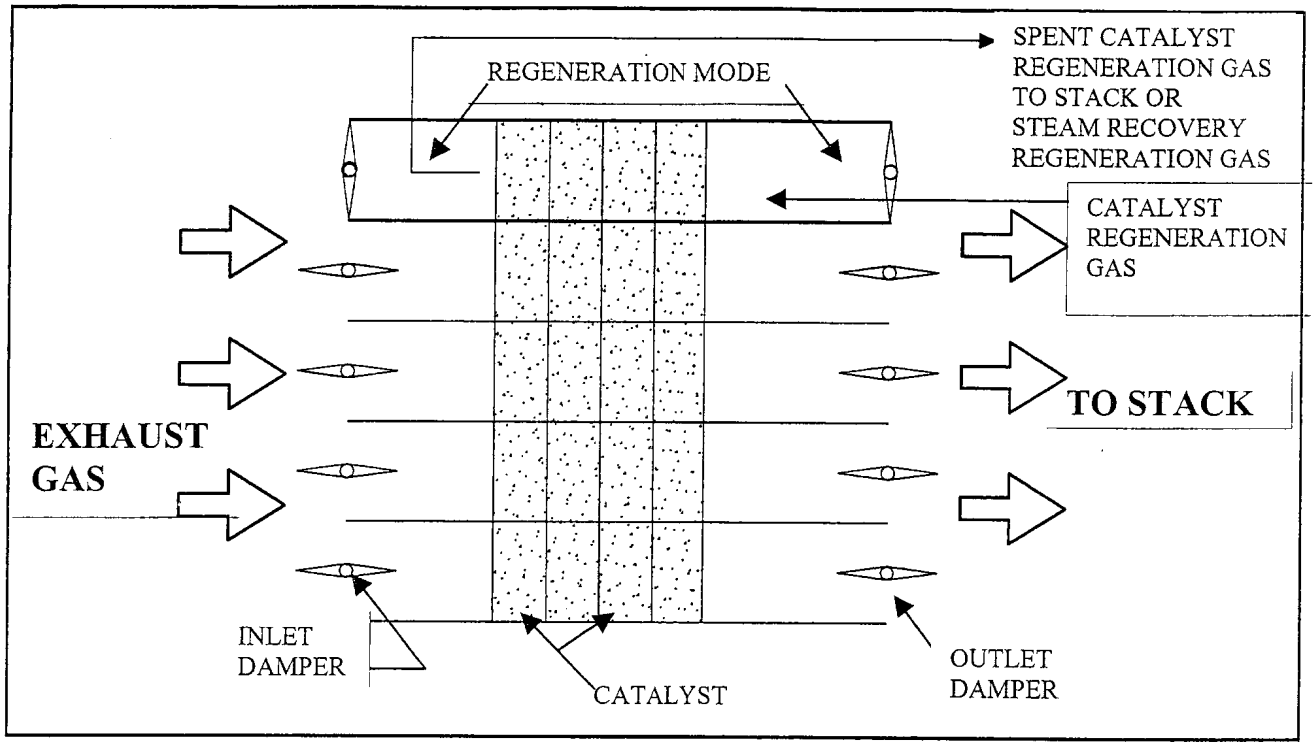


**Figure 2 – Typical SCONOx™ NOx Abatement System**

## MAJOR TECHNICAL ISSUES

SCR is the historically recognized method of NOx control in the power industry. SCONOx™, on the other hand, is a newer technology that has been widely debated within the industry for the past several years. From the body of available information available, it appears that all of the concerns surrounding SCONOx™ as an appropriate LAER technology for electric power applications can be reduced to three fundamental issues.

These are:

- Performance - The ability of SCONOx™ to consistently achieve NOx reductions similar to, or better than, those produced by SCR technology
- Feasibility - The viability of constructing and operating SCONOx™ technology for large power plants (in excess of 50 MW), which would otherwise render it as both "unfeasible" and "unavailable"

- Resource minimization - The ability of SCONOx™ technology to minimize, recover and reuse water from spent regeneration steam, which would also render it as "unavailable"

## SCONOx™ PERFORMANCE

Operating data describing the performance of SCONOx™ technology for gas turbine NOx control are currently available from several operating installations. These are:

1. 1-32 MW Sunlaw Federal cogeneration facility, Vernon CA
2. 1-5 MW Wyeth BioPharma Unit #1 cogeneration facility, Andover, MA
3. 2-15 MW University of California, San Diego (UCSD) cogeneration facility, San Diego, CA
4. 1-42 MW City of Redding, CA Municipal Electric plant, Redding CA

(Two other installations are in various stages of start-up. These are the 20 MW Los Angeles International Airport cogeneration facility, and the 5 MW Montefiore Hospital cogeneration facility in Kingston, NY.)

Wyeth BioPharma of Andover Massachusetts has recently placed an order for a second installation.

Sunlaw Federal Cogeneration Facility

The 32 MW Sunlaw Federal cogeneration facility, a natural gas fired plant, represents the first commercial application of SCONOx™ technology. Of particular interest, NOx data gathered from the Sunlaw Federal facility has been subsequently cited as the basis for the 2.0 ppm allowable NOx limit for gas turbines currently considered as LAER by the USEPA.

According to Sunlaw operating data, this SCONOx™ installation achieved NOx levels at or below 2.0 ppm for nearly all of the plant's operating hours in 2000 and 2001, with below 1.5 ppm performance for 97% of those operating hours. Furthermore, the plant has demonstrated NOx levels at or below 1.0 ppm for over 90% of the plant's operating hours.

Wyeth BioPharma Unit #1 Cogeneration Facility

Unlike the Federal facility, the Wyeth Biopharma plant operates on either natural gas or low sulfur fuel oil, with automatic changeover capability. The NOx emission limits for this installation for gas and fuel oil are 2.5 and 15.0 ppm respectively. This system has been operational since 1999, and several recent modifications have been made that significantly improve operation. When firing natural gas, this plant is currently producing NOx levels consistently below 1.5 ppm, with substantial operating periods below 1.0 ppm.

University of California San Diego (UCSD) Cogeneration Facility

The SCONOx™ systems installed at the 2-15 MW UCSD cogeneration facility have been in operation since July 2001. This natural gas fired installation also operates under a 2.5 ppm NOx limit. Like the Wyeth Biopharma facility, this system consistently produces NOx levels below 1.5 ppm, with substantial periods below 1.0 ppm. This facility is also equipped with a regeneration gas recovery system to minimize plant water loss. The recovery system features water-cooled gas condensers and a pumped condensate return system.

City of Redding, CA Municipal Electric Plant

Most recently, a SCONOx™ system serving a new 42 MW cogeneration turbine for the city of Redding, CA was made operational. The NOx limit for this installation was established at 2.0 ppm. Data collected during the first 2 months of operation indicate consistent performance NOx performance below 1.0 ppm, with levels as low as 0.25 ppm.

It is interesting to note that these facilities currently achieve NOx emissions below the federal LAER standard of 2.0 ppm, although none was specifically designed to do so. Equally significant, the CO output levels at all of these installations have been measured below the NOx emission levels. At the Sunlaw Federal Cogeneration Facility, Formaldehyde and Benzene emissions were assessed by the U.S. EPA as MACT (Maximum Available Control Technology).

Had these SCONOx™ systems been specifically designed using a NOx emission target of, say 1.5 ppm (a 25% reduction in the current LAER), it seems clear that a 1.5 ppm limit could be achieved in operation. As such, it is reasonable to conclude that SCONOx™ offers a very high probability for achieving NOx abatement below 2.0 ppm, and even to levels below 1.0 ppm, for substantial periods of time.

## SCR PERFORMANCE

Currently, there is no published information available to confirm the performance of SCR for NOx abatement of 2.0 ppm or below, regardless of turbine combustion technology. From information that is available, most sources generally describe the successful use of SCR for NOx in the 3-10 ppm range. Although power industry trade journals often cite SCR performance potential as being "...below 3.0 ppm", or "...as low as 2.0 ppm", there are no apparent references or testimonials confirming SCR control as an available technology for NOx levels as low as 2.0 ppm or below.

While SCR technology has been permitted in several combined cycle applications as LAER for NOx at 2.0 ppm (most notably in Massachusetts, with 2.0 ppm ammonia slip), none have yet been constructed. Several California facilities using SCR control have demonstrated NOx emissions in the 2.4-2.5 ppm range, although ammonia slip allowances into the surrounding environment are 10 ppm. Facilities that are known to be

currently operating at NOx emission levels of 2.5 ppm do so with an ammonia slip concentration in the range of 5-10 ppm.

## SCONOx™ VERSUS SCR

From the body of information available, it can be concluded that SCONOx™ technology continuous to consistently demonstrate NOx removal performance below 2.0 ppm. SCR technology, on the other hand, while in commercial use at higher NOx emissions levels, has not been shown to demonstrate NOx control below 2.0 ppm.

Furthermore, it also appears reasonable to conclude that SCONOx™ can achieve NOx abatement levels below 1.0 ppm for a significant portion of plant operating time. There is no evidence to support a similar conclusion for SCR NOx abatement.

In addition, SCR NOx abatement results in $NH_3$ emissions due to over injection (slip) for NOx control that are inherently unhealthy and unavoidable. These emissions increase as the incoming NOx concentration decreases, which suggests that SCR is a misapplication in areas where low $NH_3$ emissions are required. Relative SCR and SCONOx™ performance is summarized in Table 1.

**TABLE 1**
**PERFORMANCE SUMMARY**

| | SCR | SCONOx™ |
|---|---|---|
| • **NOx out @ 15-25 ppm inlet** | **2-5 ppm** | **less than 2ppm** |
| • **NOx out @ < 10 ppm inlet** | **2-5 ppm** | **0.5 -1.5 ppm** |
| • **$NH_3$ slip @ 15-25 ppm NOx inlet** | **3-6 ppm** | **0** |
| • **$NH_3$ slip @ < 10 ppm NOx inlet** | **2-10 ppm** | **0** |
| • **NOx out @ < 10 ppm inlet (additional Catalyst Required)** | **yes** | **no** |
| • **Additional CO/VOC catalyst system required** | **yes** | **no** |

As noted earlier, LAER involves the most stringent emission limitation available for a given category of source. It thus seems clear that the purpose of the regulation is to attain the greatest degree of emissions reduction for a criteria pollutant: specifically NOx in this case. From a permitting perspective, therefore, it is important to note that; when applied to commercial gas turbines:

- Where NOx reductions are required to be 2.0 ppm or below, SCONOx™ appears to be the only commercially available technology with the demonstrated ability to achieve those limits on a consistent basis. SCR is not an available technology in these

applications, and should be considered a misapplication unless specific operating data to the contrary can be furnished.

- Where DLNC turbines are the NOx source, and ammonia emissions must be minimized to 2 ppm (or less), SCR NOx control will not be effective in meeting this limitation as well.
- Ammonia Issues like ammonia slip and its inherent airborne particular matter formation, ammonia transportation and ammonia storage permitting and evacuation plans are completely eliminated with the use of the SCONOx™ technology.

## SCONOx™ FEASIBILITY AND SCALE-UP

For LAER applications, an argument against the use of SCONOx™ is often made on the basis of a lack of technical feasibility for scale-up when compared to SCR. The cost and risk of SCONOx™ relative to SCR are also typically cited to support this lack of technical feasibility.

For proper consideration, however, the question of technical feasibility is one that must be considered separately from the cost/risk argument. Cost versus risk is more appropriately a discussion of how technically optimal the process may be for a given installation. The following discussion puts these questions into the appropriate perspective.

## TECHNICALLY FEASIBLE PROCESSES

Technically feasible processes are those with the following characteristics:

1. The basic chemistry is well understood and documented.
2. The process can be scaled to any size with identical results (scalability).
3. Systems can be constructed with commercially available components.
4. Commercial installations are operating or under construction.
5. The system itself is commercially available for purchase.

These characteristics apply to a wide variety of technologies in the chemical process industries, many of which are well understood; although variations in system size may present different engineering or construction challenges.

At present, eight SCONOx™ systems for gas turbine NOx control are either in-place, permitted, or under construction in the US, representing 659 MW of power generation. These include:

- Otay Mesa Generating Project, Otay Mesa, CA 1-520 MW gas-fired GE 7F Low NOx, turbine generator power plant, recently permitted using SCONOx™ technology, with an SCR fall-back option. (permit approved)

- Redding Electric Utility, Redding, CA 1-42 MW gas-fired turbine generator power plant, permitted using SCONOx™ technology (currently in operation)
- Sunlaw Federal Cogeneration facility, Vernon, CA 1–32 MW gas-fired turbine generator power plant (currently in operation after six (6) years of continuous operation)
- University of California at San Diego, San Diego, CA 2-15 MW gas-fired turbine generator power plant (currently in operation)
- Los Angeles International Airport, Los Angeles, CA 1-20 MW gas-fired turbine generator power plant (currently in the final start up phase)
- Wyeth BioPharma Unit #1, Andover, MA 1-5 MW dual-fuel fired turbine generator power plant (currently in operation)
- Wyeth BioPharma Unit #2, Andover, MA 1–5 MW dual fuel fired turbine generator power plant (currently under construction)
- Montefiore Hospital, Kingston NY 1–5 MW dual fuel fired turbine generator power plant (currently in start-up)

With regard to these and future installations, it appears that SCONOx™ NOx abatement is technically feasible as it meets each of the aforementioned feasibility criteria. Of particular note:

1. The basic chemical processes are proven and commercially operational in each instance.
2. Because the process is modularized, it has been scaled in size with predictable and identical results (the Redding facility is eight times the output of Wyeth BioPharma Unit #1)
3. Commercially available equipment, materials and methods similar to those that might be found in other power plant systems were used in these applications
4. SCONOx™ systems are commercially available and are offered for sale.

Given these considerations, it is therefore reasonable to conclude that, as SCONOx™ technology has gained acceptance for an increasingly wider range of power plant sizes, it can be regarded as technically feasible for most gas turbine applications.

As if to underscore this conclusion, USEPA Region 1 has issued its own opinion of SCONOx™ technology. In a December 20, 1999 letter to the Massachusetts Department of Environmental Protection (MDEP), USEPA Region 1 stated that it had "... concluded that our earlier technical concerns about SCONOx™ have been resolved, and that there are no known scale-up concerns with SCONOx™. Consequently, it is our view that SCONOx™ is a technically feasible control option for large combined cycle power plants."

Of major emphasis is also the current customer satisfaction with the performance of the installed SCONOx™ systems. As of June 2002, Wyeth BioPharma of Andover Massachusetts has placed a purchase order for an additional unit (Wyeth BioPharma Unit #2).

## TECHNICALLY OPTIMAL PROCESSES

Technically optimal processes can be characterized as follows:

1. The mechanical installation is fully refined.
2. The technology is available throughout the marketplace so that vendors are numerous and costs are competitive.
3. System contingencies are well understood and predictable.
4. Risk is minimized due to a large installation base.

Many processes that are technically feasible may not be technically optimal (or mature) due to a small installation base. These include such commercially available technologies as solar power systems, coal gasification, and electric powered vehicles. None of these technologies can be considered mature, but all are installed and operated reliably on the basis of sound engineering and construction principles.

Given the growing number of permitted and operating SCONOx™ installations, the technology is rapidly approaching a point where costs and risks are becoming consistent with system size. It is therefore reasonable to conclude that while current SCONOx™ technology may not yet be entirely technically optimal for a specific application, it can nonetheless be applied with predictable results. It also seems clear that this conclusion is consistent with the USEPA determination cited earlier.

Furthermore, PG&E has proposed the use of SCONOx™ technology for the 520 MW Otay Mesa plant to be built in Southern California. From all indications, it appears that PG&E was fully aware that SCONOx™ is technically feasible at this scale with acceptable levels of project risk.

## WATER CONSERVATION AND WASTE STEAM RECOVERY

One final argument in the SCONOx™/ SCR debate involves the loss of water required for the regeneration process. SCONOx™ NOx reduction requires the use of superheated steam in the production of regeneration gas for the catalyst desorption process. Smaller units discharge this spent regeneration gas (hence water) to the exhaust stack. For large-scale facilities, the water usage associated with this waste steam may be significant.

Water recoveries of 80% are attainable using a properly engineered regeneration gas control and recovery system. This system requires:

1. Low leakage isolation dampers to minimize losses during the regeneration process
2. Uniformly distributed supply and exhaust to minimize chamber pressures during regeneration
3. Active chamber pressure control/waste gas removal by use of a vacuum exhauster, which also serves to reduce the dependence of the process on damper leakage

4. Water recovery by use of an appropriately sized, water cooled, condenser, with the condensate returned to the plant condensate system

## CONCLUSIONS

In light of the bulk of information currently available for both SCONOx™ and SCR NOx abatement, the following conclusions can be reasonably drawn.

1. SCONOx™ has been demonstrated to meet the current requirements of Federal LAER for NOx, and has been certified by the California EPA for 2.0 ppm NOx abatement as being "technically feasible".

2. SCONOx™ has demonstrated NOx removal to levels lower than 2.0 ppm, and below 1.0 ppm, on a consistent basis. Recently installed systems continue to demonstrate performance in this lower range.

3. There is no data available to support a conclusion that SCR technology can be installed and operated to demonstrate NOx control of 2.0 ppm or less. In cases such as these, SCR cannot be considered as either an "available" or "technically feasible" NOx control option.

4. There is no data available to support a conclusion that SCR technology can be installed and operated to achieve 2.0 ppm (or less) NOx, while simultaneously achieving ammonia slip levels as low as 2.0 ppm: particularly when applied to DLNC turbines.

5. For large combined cycle plants, SCR technology even in the most optimistic scenario of 2ppm $NH_3$ slip can emit up to 45 tons per year or more of ammonia, while SCONOx™ requires no $NH_3$ for its operation.

6. SCONOx™ should be considered "technically feasible" for large applications, given its modular scalability, recent project permits, and overall favorable determination by USEPA Region 1 in December 1999.

7. SCONOx™ can be considered as "available" for large application, as it is offered in the marketplace, and can be engineered, constructed and operated to control NOx emissions to 2.0 ppm or lower.

8. SCONOx™ systems can be furnished to recover 75% to 80% of the waste regeneration steam to limit the use of site water resources where required, which is a common concern among large power producers.

9. Where applicable, the ERCs generated with the use of a SCONOx™ system can be sold to offset the initial SCONOx™ capital investment.

10. The SCONOx™ catalyst subsequent residual value at the end of its useful life can also be used to offset the operating and maintenance costs of the system.

11. Operation and Maintenance contracts are available through the life of the SCONOx™ systems.

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14. Review of "21,000 Hour Performance Report on SCONOx™", Sunlaw Energy Partners, September 15, 2000
15. Review of Sunlaw Federal 42 MW Cogeneration Plant NOx data, 04/00 through 09/00
16. Review of Sunlaw Federal 42 MW Cogeneration Plant NOx data, 11/01 through 01/02
17. Review of Genetics Institute 5 MW Cogeneration Plant NOx data, 11/01 through 02/02
18. USEPA RACT/BACT/LAER Clearinghouse

## Noise

Name
Dustin Peasha

I testify that on the dates surveyed by CH2MHILL and their equipment, I witnessed vineyard tractors and their noise. The noise was clearly heard over every other outside noise usual for our residence.

Dustin Peasha

Dustin Peasha
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